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POLYESTER INDUSTRY IN EGYPT*

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About 5 years ago Misr Rayon commenced its first polyester plant for staple fibre. The plant consists of: 2 units for producing PET cotton type 1.4 denier with 36 tons per day capacity for each. The type produced is T 110 Rhone Poulenc Textile and one unit of woolen type T900 of the same company producing 12 ton /day.

T110 developped about 15 years ago is characterised by

- a high tenacity, 54 cN/tex (5.5 g/tex), which enables:
  . high spinning efficiencies to be obtained.
  . previously unreachable spinning limits to be achieved: e.g. using a 1.6 dtex staple fibre it is possible to spin as fine as 5.6 tex (180 nm) with a blend of 67% polyester and 33% cellulosic.
- a strength/elongation curve very similar to that of natural and man-made cellulosic fibres, thereby improving spinning and weaving efficiencies.
- a low shrinkage rate :

  3 to 4 % in saturated steam at 130°C
  4.5 % in dry air at 150 °C

  specially adapted for dyeing on cross wound cheese of 100% polyester or blended yarns.

The characteristics of the R.P.T. type T 110 polyester fibres makes them particularly suitable for a wide range of woven fabrics either in 100% form or blended with cellulosics; this range includes the lightest of voile type articles for lingerie and shirtings and heavier fabrics such as drapery for shirtings, trouserings, over coats etc.

The type T110 fibre is available in semi-dull and bright. we can tabulate these characteristics as follows: for short staple equipment

T 110 semi-dull

- Tenacity 53-56 CN/tex - extension at rupture 20-25% shrinkage in water at 100 °C 1.5% - Shrinkage in steam at 130°C 3-4 %
- Spinning process: conventional - open-end
- End use: woven fabrics
- Usual processing: 100% or blended with all cellulosic fibres
- Industrial spinning limits: 1.6 dtex 32 & 40mm

	conventional	open-end
100% polyester	8.3 tex (Nm 120)	13.3 tex (Nm 75)
Polyester blended with Cellulosic fibres:		
combed cotton	8.3 tex (Nm 120)	14.3 tex (Nm 70)
carded cotton	10.0 tex (Nm 100)	20.0 tex (Nm 50)
Man-made 1.6 dtex/40 mm	9.1 tex (Nm 110)	14.3 tex (Nm 70)

- Main applications: Solid and printed dress fabrics Weft velvet clothing, shirts, pyjamas-lingerie - rainwear, anoraks - work wear - linings - sheetings - Table linen - furnishings - curtainings - technical uses.
- Advantages and disadvantages: High tenacity and low extension, giving: higher spinnability - high strength characteristics in the yarn. Low shrinkage giving: possibility to yarn dye without pre-shrinkage. For clothing and furnishing, singeing, brushing and shearing are necessary.

The fibres were crimped to have the necessary cohesion, treated with finishes to have the necessary antistatic properties and the optimum degree of fibre-fibre, fibre-metal dynamic and static friction.

T 900 is a low pill polyester fibres characterised by a reduced transverse resistance which facilitates the breaking (due to rubbing) of the surface fibrils in the yarn, leading therefore to the elimination of pilling.

The general characteristics of this type for long staple equipment are as follows:

- Characteristics: tenacity 27-29 cN/tex. Extension at rupture 37-40%. Shrinkage in water at 100°C 2%. Shrinkage in steam at 130 °C 3.5%
- Spinning process: stretch breaking (1)
  converting) (2)
  wool-worsted)
- End use: woven and knitted fabrics
- Usual processing: 100% or blended with wool, cellulosic fibres or synthetics.
- Industrial spinning limits

			Fiber number in dtex 3.3	4.4	6.7
. 100% polyester					
Polyester blended with	45% wool	(1)	22.2 tex (Nm 45)	26.8 tex (Nm38)	33.3 tex (Nm30)
		(2)	25.0 tex (Nm40)	29.4 tex 5Nm34)	38.5 tex (Nm26)
	33% Cellulosics	(1)	18.2 tex (Nm55)	21.7 tex (Nm46)	31.3 tex (Nm32)
		(2)	20.0 tex (Nm50)	23.8 tex (Nm42)	36.7 tex (Nm28)

- Main applications: Drapperie - wool type fabrics - Dresswear and pleated shirts - stretch articles or blended with textured yarn-circular knitted fabrics - curtaining (solid and printed)
- Advatages and disadvantages: Flax-abrasion index particularly adapted for woven fabrics - less processing (no singeing) - fancy weaves and less structured weaves - softer handles - good dye affinity - lower tenacity requiring some precautions during the various stages of processing.

Misr rayon has now lines for producing chips for POY manufacturing and new development for producing higher deniers to satisfy market requirements for carpet industry. Misr Rayon has another factory for POY production and textured yarns with capacity reaching 12 tons /day.

Now, there is a feasibility study for another fibre plant with double capacity of the first plant to satisfy the textile mills demands in Egypt for polyester fibre.

The question is MDT origin or TA origin
The 2nd question is continuous or batchy process.
The major advantages of pure TA as a feedstock are :

1- Less TA than DMT is required to produce polymer. The price of DMT and pure TA are approximately the same.
2- Theesterification operates nearer the theoritical molar ratio reducing the load of glycol for recovery.
3- Capital cost of polymer plant is lower.
4- Consistent quality is easier to achieve
5- Reaction rate of monomer produced from TA is higher than that from DMT.
6- No methanol handling and recovery is required.
7- No ester interchange catalyst is required.
8- TA is a simpler solid to handle than DMT

The advantage of CP Process

1-Eliminates variation: Batch to batch - through the batch
2- Less dependance on operators (eg. esterifier transfer, additive and casting)
3- Direct spin capacity - initially or subsequently (eliminate casting, blending and drying costs)

4- Lower capital cost for large plants.
5- Less additives required - Potential higher quality

Advantage pf Batch Polymer Process

1- Lower capital cost
   Up to 40 t/day via direct spin
   Up to 80 t/day via continuous chip
2- Easier to recover after service/power failure or mal-operation
3- Easier to clean if quality drifts.
4- Easier to change formulation (TiO_2IV)
5- Can be run in campaigns for type and output fluctuations
6- Can be expanded more cheaply and in smaller steps
7- Easy to change from DMT to TA and vice-versa

Batch Process May be more suitable to the condition of the third world with the following features :

1- Capable of most stringent polymer quality
2- Optimised polymerisation conditions.
3- Advanced overhead design - free from blockage
4- Optimised additive preparation.
5- Production from pure TA or DMT.